



Advanced Light Combat Vehicle Armament  
(ALACV)  
Air Bursting Munition

Mr. John Hirlinger  
Cannon Ammo Br, Light Arm't Div  
CCAC, TACOM-ARDEC  
12 April 2001

Report Documentation Page		
<b>Report Date</b> 12Apr2001	<b>Report Type</b> N/A	<b>Dates Covered (from... to)</b> -
<b>Title and Subtitle</b> Advanced Light Combat Vehicle Armament (ALACV) Air Bursting Munition	<b>Contract Number</b>	
	<b>Grant Number</b>	
	<b>Program Element Number</b>	
<b>Author(s)</b> Hirlinger, John	<b>Project Number</b>	
	<b>Task Number</b>	
	<b>Work Unit Number</b>	
<b>Performing Organization Name(s) and Address(es)</b> CCAC, TACOM-ARDEC	<b>Performing Organization Report Number</b>	
<b>Sponsoring/Monitoring Agency Name(s) and Address(es)</b> NDIA (National Defense Industrial Association) 211 Wilson Blvd, STE. 400 Arlington, VA 22201-3061	<b>Sponsor/Monitor's Acronym(s)</b>	
	<b>Sponsor/Monitor's Report Number(s)</b>	
<b>Distribution/Availability Statement</b> Approved for public release, distribution unlimited		
<b>Supplementary Notes</b> Proceedings from the 36th Annual Gun & Ammunition Symposium & Exhibition 9-12 April 2001 Sponsored by NDIA		
<b>Abstract</b>		
<b>Subject Terms</b>		
<b>Report Classification</b> unclassified	<b>Classification of this page</b> unclassified	
<b>Classification of Abstract</b> unclassified	<b>Limitation of Abstract</b> UU	
<b>Number of Pages</b> 20		



## Briefing Agenda

- Objectives
- Demonstration Vehicle Constraints
- Case Length Determinations/Mann Barrel Interface
- Body Sleeve
- Baseline Body Design Analysis
- Fuze



## Objectives

- Develop a cartridge that will burst at a pre-determined location
- Show an increase in lethal area of 400% when compared to a 30 x 173 HEI projectile with a PD fuze



# TACOM

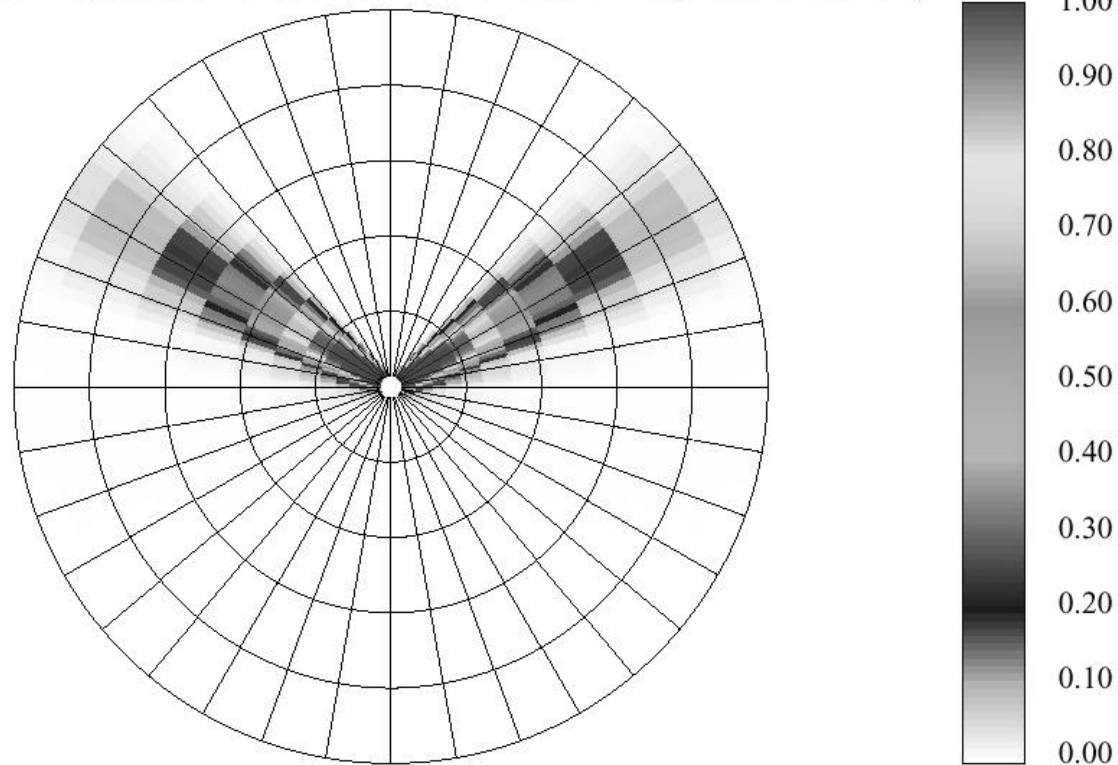
Lethality, Survivability, Mobility and  
Sustainment for America's Army

## PROBABILITY OF INCAPACITATION GIVEN A BURST

Warhead: Generic 30mm

Range: 1000 m - Burst Height: 0.00 ft

Prone Target - Incapacitation Criterion: 30 Second Assault - Body Part: Whole Body





# TACOM

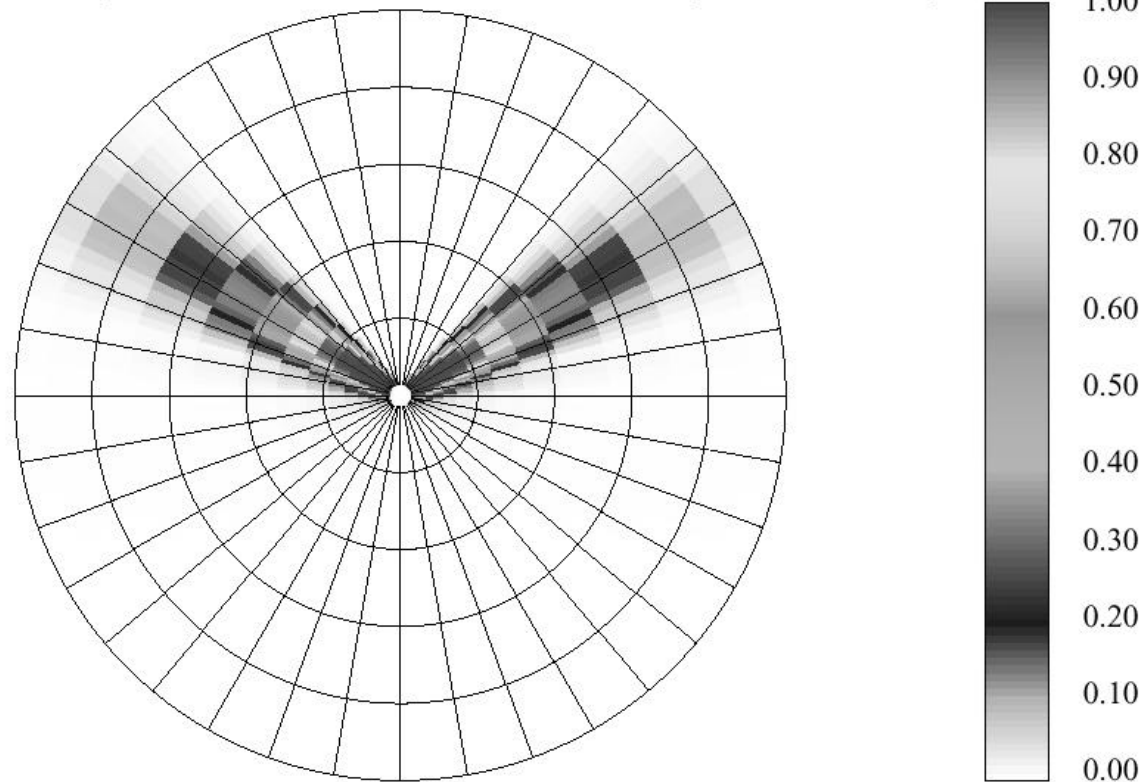
Lethality, Survivability, Mobility and  
Sustainment for America's Army

## PROBABILITY OF INCAPACITATION GIVEN A BURST

Warhead: Generic 30mm

Range: 1000 m - Burst Height: 0.00 ft

Prone Target - Incapacitation Criterion: 30 Second Assault - Body Part: Whole Body

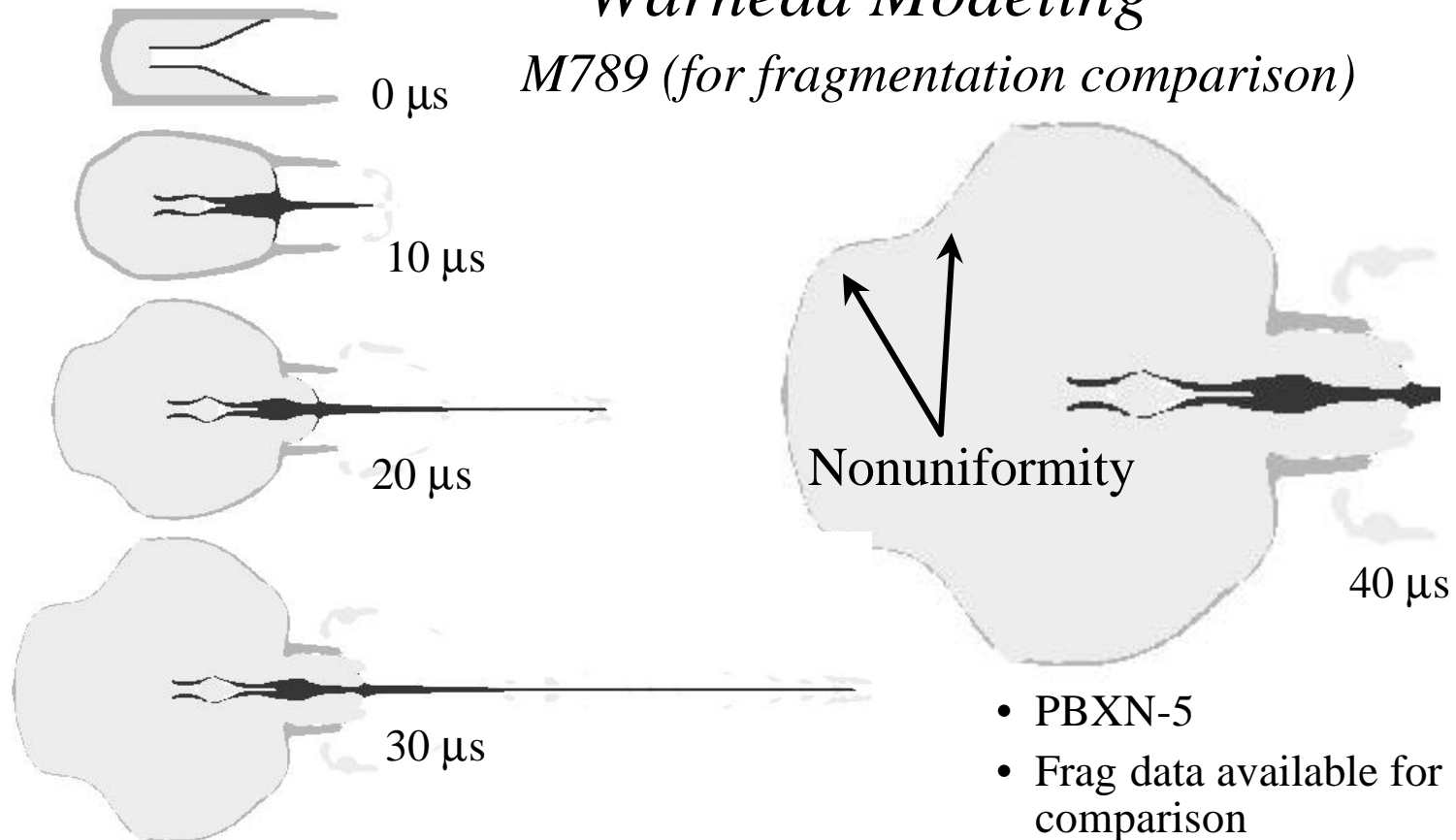


Tank-automotive & Armaments COMmand



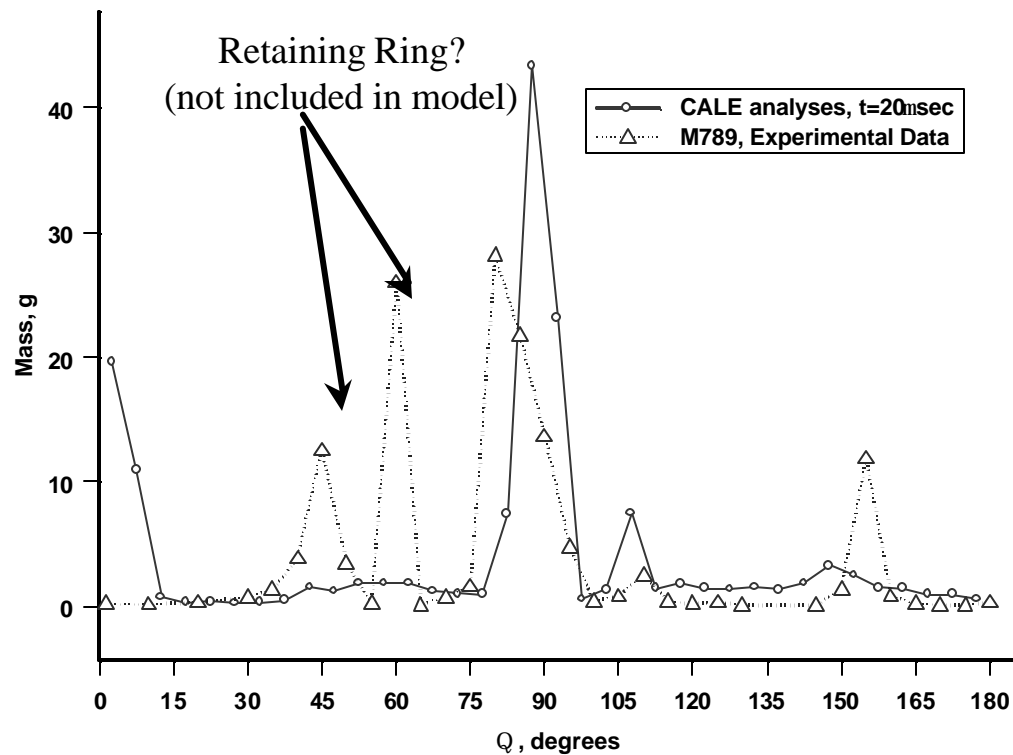
## Warhead Modeling

*M789 (for fragmentation comparison)*





## *M789 fragmentation comparison*



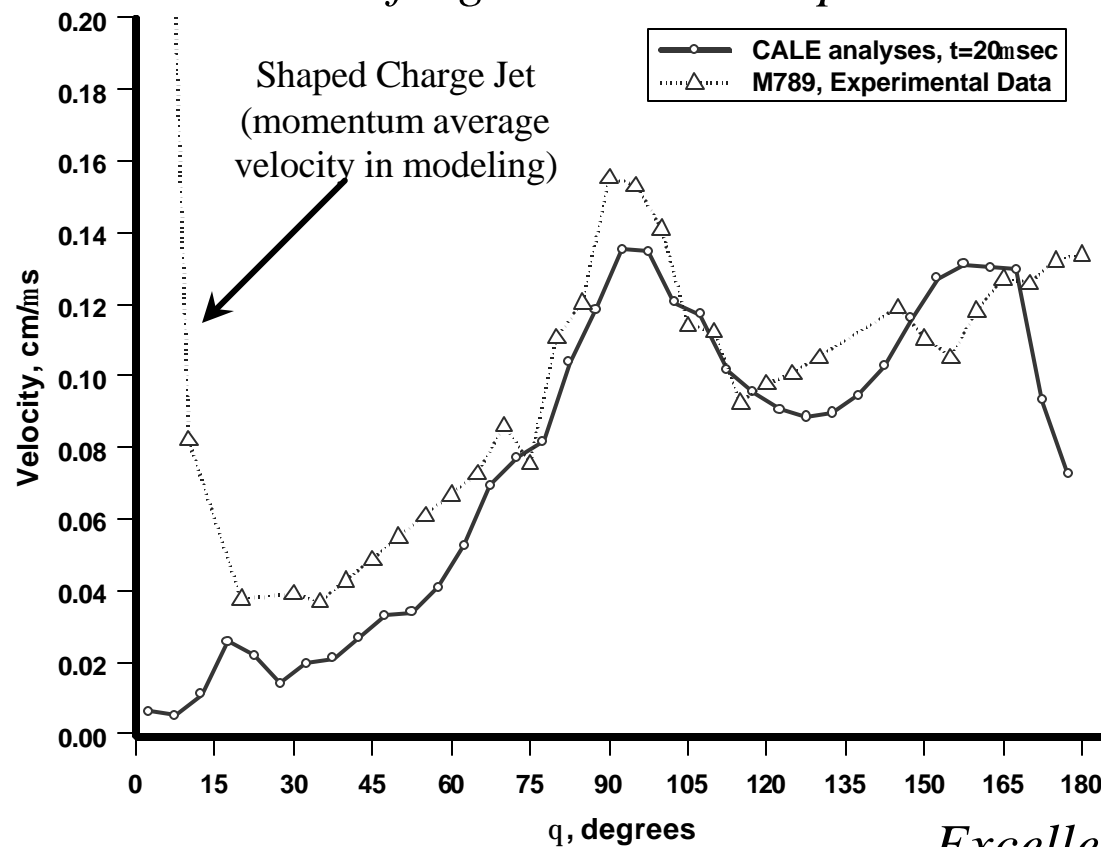
*Excellent Agreement!*

Tank-automotive & Armaments COMmand

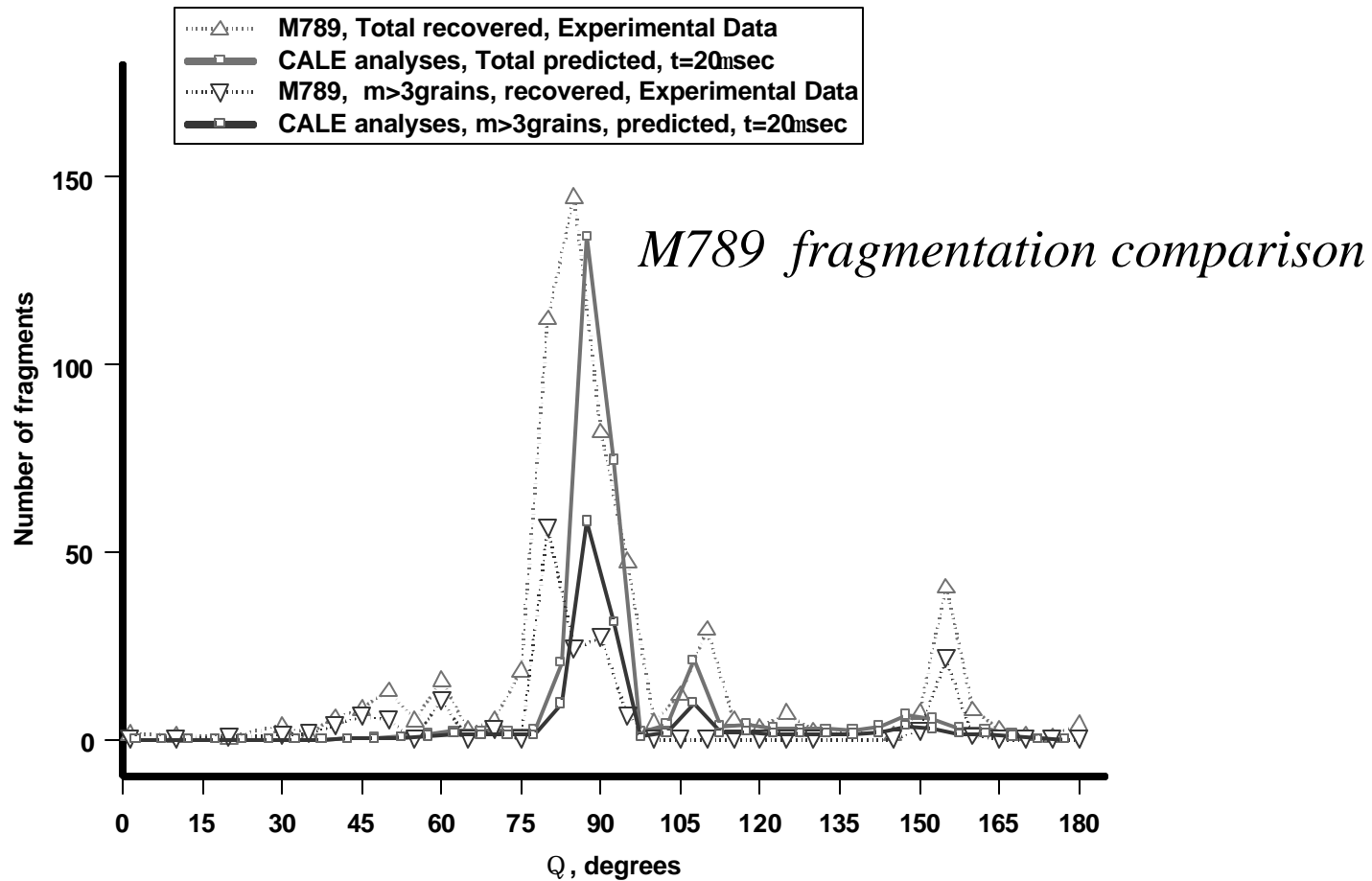




### *M789 fragmentation comparison*

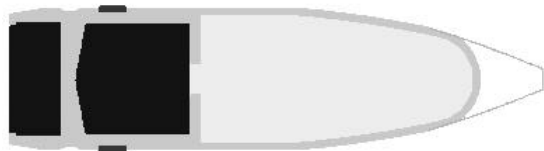


*Excellent Agreement!*





## *Preliminary Baseline Base Fuzed*



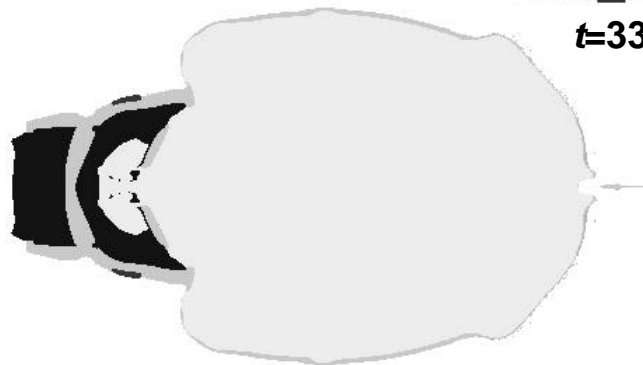
$t=11.2\%$  (0.0885 in)



$t=22.5\%$  (0.1770 in)

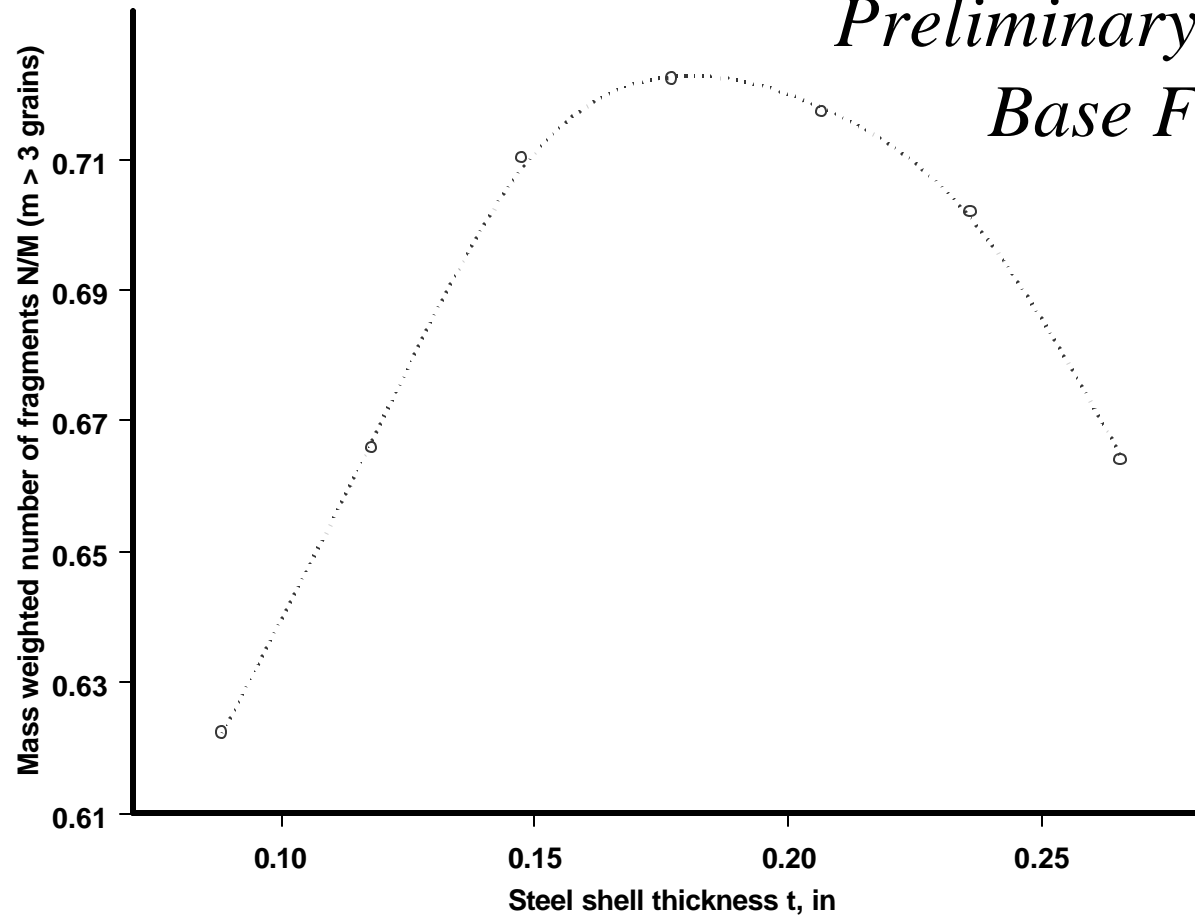


$t=33.7\%$  (0.2655 in)

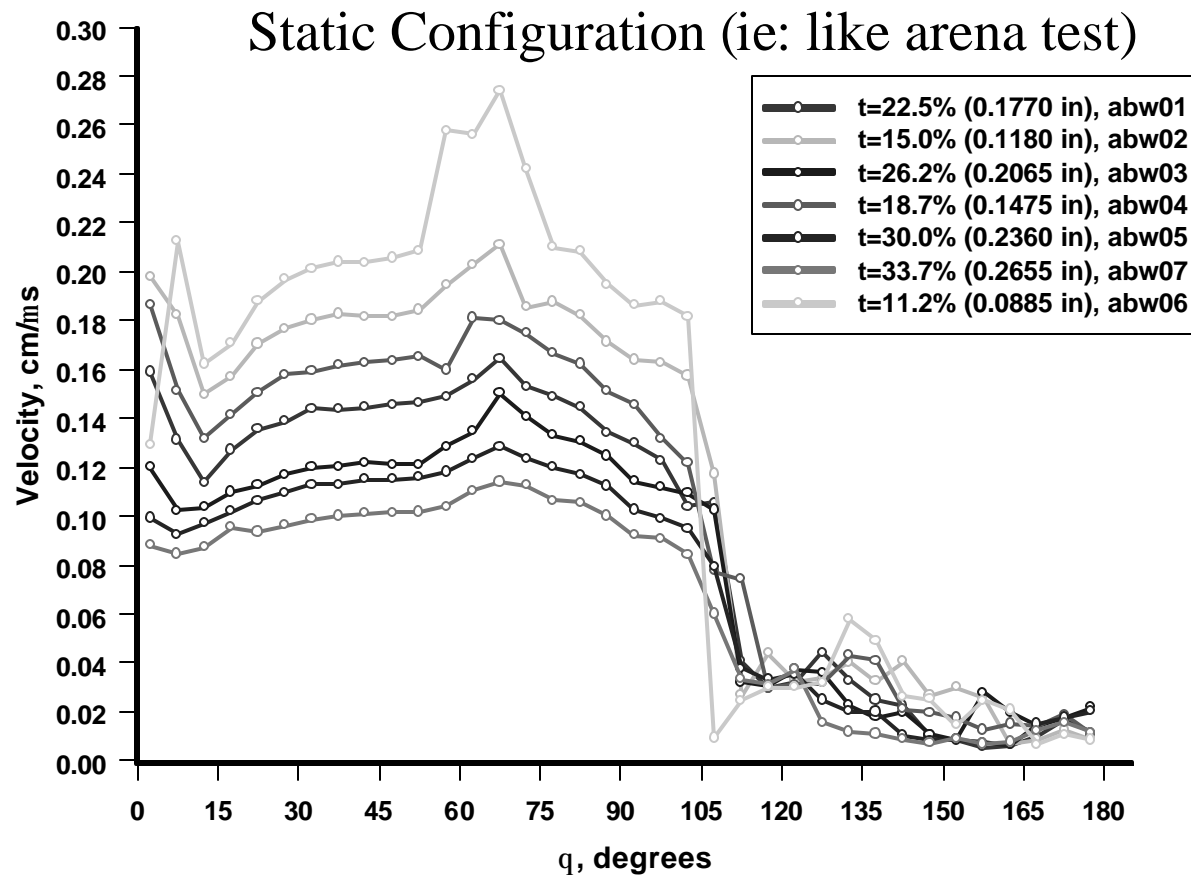




## *Preliminary Baseline Base Fuzed*



Tank-automotive & Armaments COMmand





# **ACOM**

Lethality, Survivability, Mobility and  
Sustainment for America's Army

## *ALACV A/B Warhead* *Downselected Baselines*

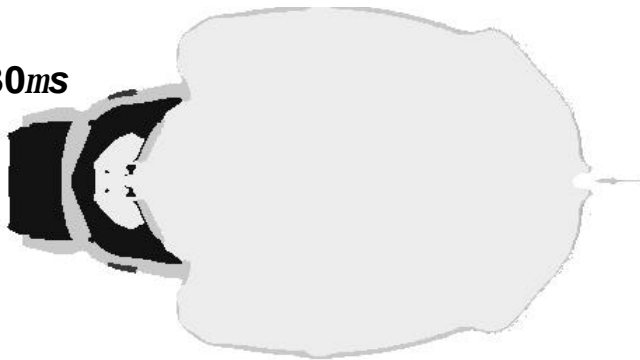
**$t=0ms$**



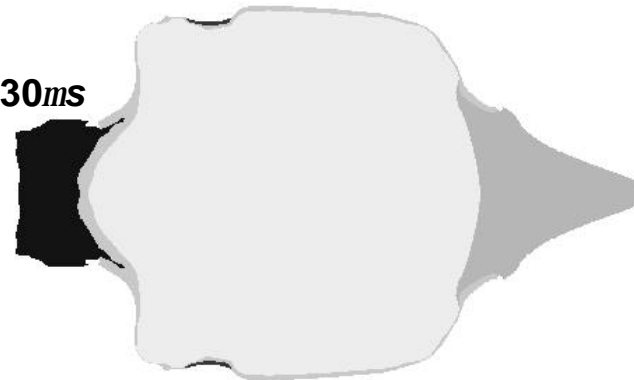
**$t=0ms$**



**$t=30ms$**

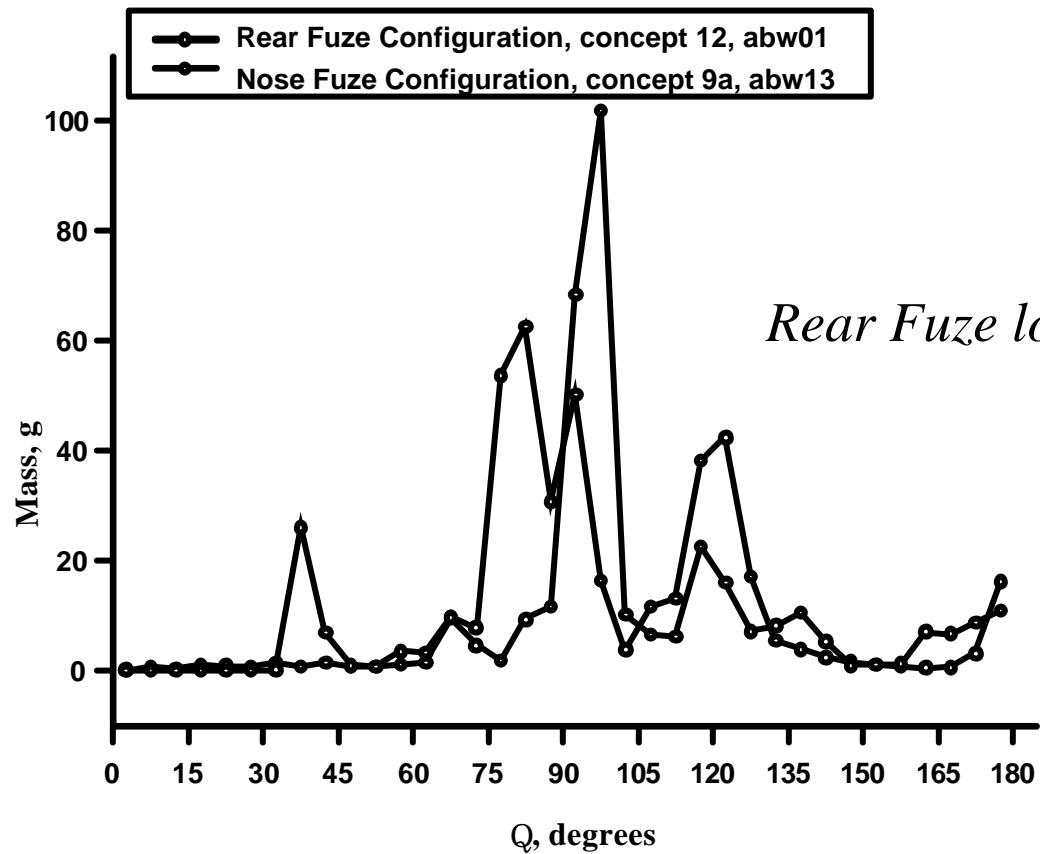


**$t=30ms$**



**Rear Fuze Configuration  
(concept 12, abw01)**

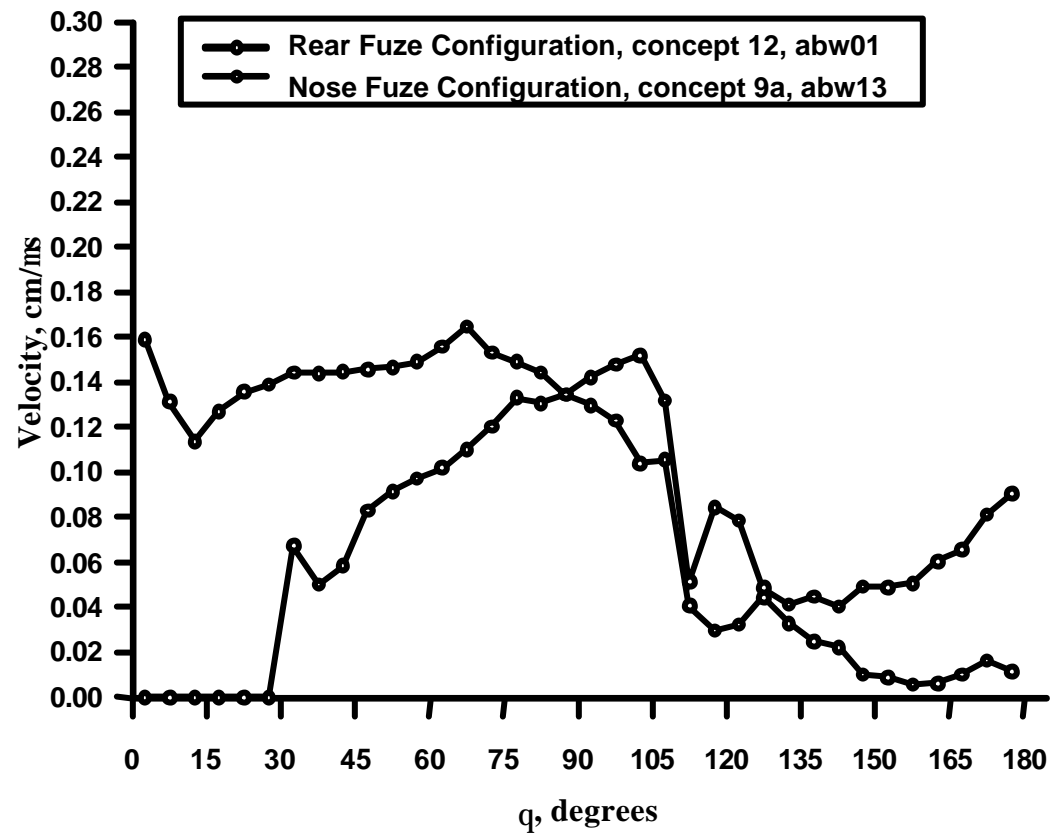
**Nose Fuse Configuration  
(concept 9a, abw13)**





# TACOM

Lethality, Survivability, Mobility and  
Sustainment for America's Army







**TACOM**  
Lethality, Survivability, Mobility and  
Sustainment for America's Army

## *Fragmentation Testing*

Test Set-up



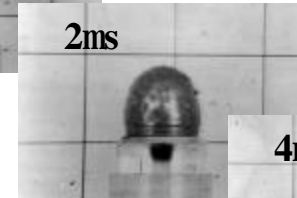
Original  
Warhead



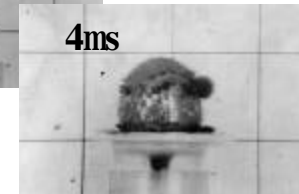
High Speed  
Photography



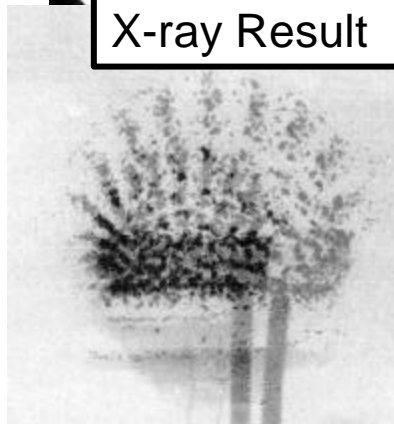
2ms



4ms

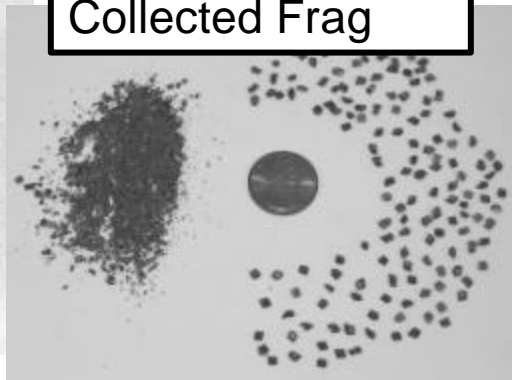


X-ray Result



*Velocity Distribution!*

Collected Frag

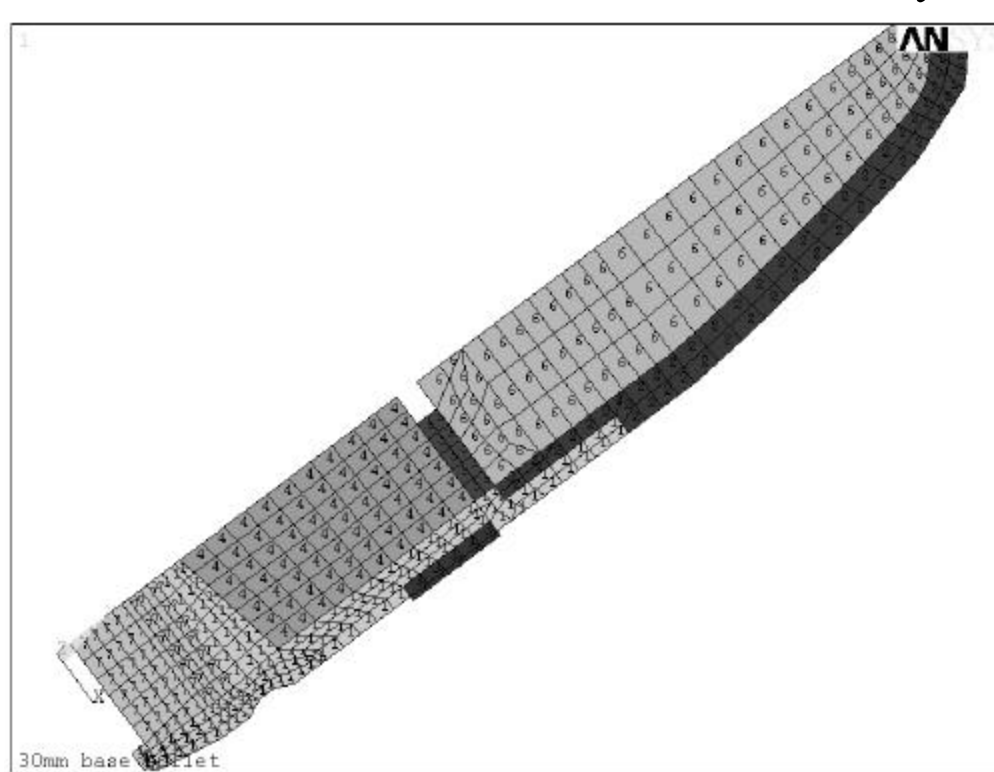


*Mass Distribution!*

- *Velocity Distribution*
- *Mass Distribution*
- *Required Design Information*
- *Less expensive/time than Arena*
- *Final Prototype Arena Testing*



## *Base Initiated Steel Baseline Finite Element G-load analysis*

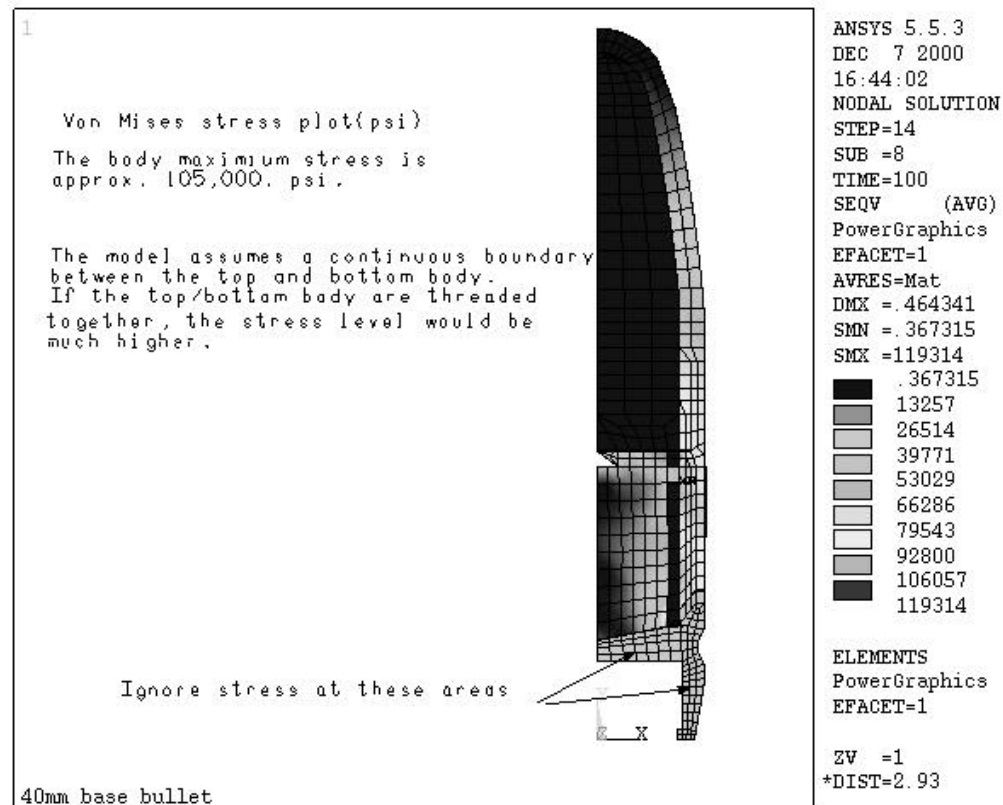


Tank-automotive & Armaments COMmand



## *Finite Element G-load analysis*

Warhead  
Survives  
Full Load



Tank-automotive & Armaments COMmand

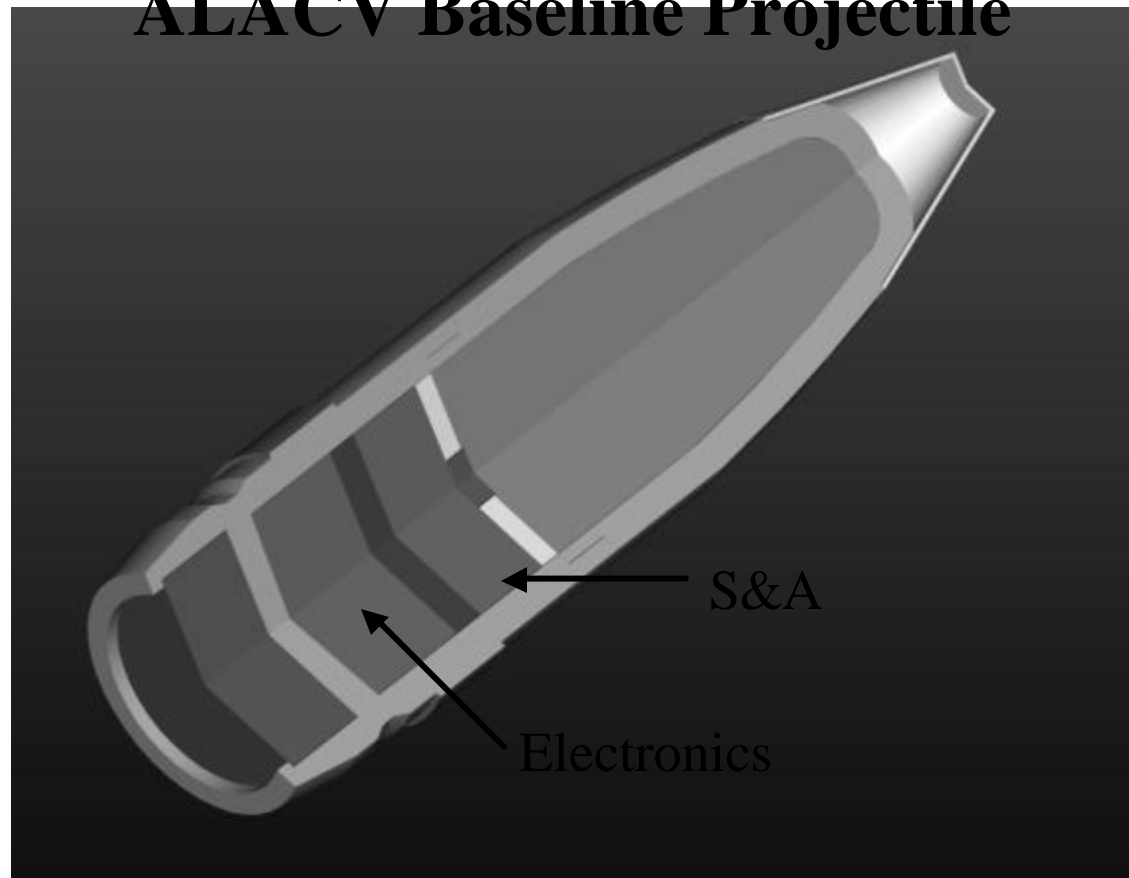


## **ALACV FUZE**

- In-house Design of a Modular Timed Fuze
  - Maximum Use of Off-The-Shelf Components
  - Pre-set Time Input
  - Single Shot Test Firing Only
- CRADA with Industry
  - Define Interfaces between Electronics/S&A
  - Partner to Demo Advanced Designs & Multiple Mission Modes



## ALACV Baseline Projectile



Tank-automotive & Armaments COMmand